

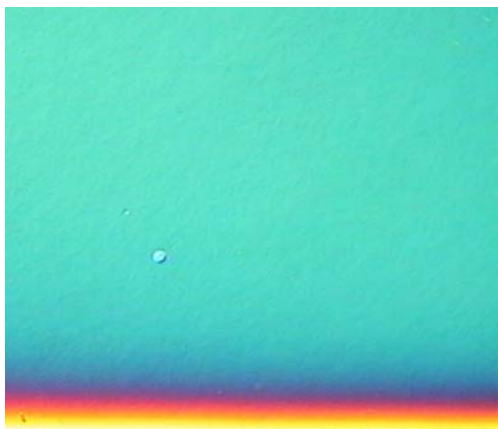


# Very Low Defect Density 4H-SiC Thin Films and Their Application to High Power Devices

Robert Davis, North Carolina State University

email: robert\_davis@ncsu.edu

Contract: ONR N00014-02-1-0580



**$11\bar{2}0$  4H-SiC Epitaxial Films**

## Objective:

- Growth and characterization of 4H-SiC( $11\bar{2}0$ ) thick films for high-power devices without degradation over long periods

## Main Technical Approaches:

- High-temperature chemical vapor deposition growth on 4H-SiC( $11\bar{2}0$ ) to achieve thick films
- Determine mode of growth via AFM on etched or unetched surfaces that achieves lowest defect density and polytype control
- Characterization of thick films via XRD, AFM, TEM, SIMS, and Hall effect measurements

## Accomplishments:

- Initial films demonstrated to 81  $\mu\text{m}$
- Structural, microstructural, optical and electrical film characterization
- Reactor modeling and design

## Work Remaining:

- HTCVD SiC epitaxial film growth
- Commission reactor and growth and characterization of films

## Impact of Technology:

- High purity, low defect density films suitable for stable high power devices

## Technology Transition:

- Issue reports on growth of thick 4H-SiC( $11\bar{2}0$ ) films via HTCVD and results of structural, microstructural, chemical and electrical characterization
- Ideas and inventions of NCSU personnel will be patented by NCSU and licensed to external corporations
- Inventions produced via collaborative efforts between NCSU personnel and those from an external organization will be patented by both parties